



Materials Engineering Branch

TIP*



No. 076 Spray Painting Problems

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The application of thermal control paints to space hardware surfaces is a common process. However, several problems have occurred repeatedly because of a lack of experience by the technician or failure to heed some basic precautions. First, the paint that is selected should be one that is low in vacuum outgassing. Materials TIP 040 describes the outgassing test and criteria followed by GSFC. It should be noted that large areas coated with a paint, having borderline outgassing properties (%TML and %CVCM), will still result in a substantial volatile condensable due to the large quantity of paint employed in a typical application. Therefore, such painted substrates should be given a thermal vacuum bake out to reduce this load.

Some problems encountered and suggested precautions to observe in the paint application follow:

1. Over spray: This is the application of too thick a paint film and usually occurs when spraying an irregular object with struts, baffles, edges, etc. that receive a greater deposit than the surrounding surfaces. The results are formation of runs, drops, uneven contour, and fragile film areas. To avoid such a problem, some parts may be able to be sprayed before being assembled. The areas that are subject to the over spray, e.g., struts or brackets in front of the major area, can be shielded from the spray gun until the background has been sprayed, then uncovered and painted themselves.
2. Improper solvent: Use of the wrong type or amount of thinner or solvent added to make the paint sprayable can decrease the flow rate if too little is used, or make the paint film run if too much is used. The wrong solvent balance may result in high outgassing that requires a long time to outgas because the surface may develop a solid film before the solvent has been released. The wrong kind of solvent will affect the cure and may cause peeling or flaking. It is imperative to use the solvent recommended by the manufacturer.

3. Dry spray: If the spray gun is held too far from the surface to be painted, the individual droplets of paint may lose too much of the solvent and arrive at the surface in a dry state causing poor flow, poor adhesion and the generation of particulates.

4. Primer: Omission of or improper selection of a primer for the paint or an improper thickness may result in lack of adhesion. Primers are especially important for silicone-based paints and on glass substrates. Dry primer thickness must be limited to 0.2 - 0.5 mils maximum. Surface preparation of the substrate is also of great importance. Cleanliness should never be ignored and, where possible, abrading the surface, as in the case of metals and some polymers, should be considered.

5. Drying time: Adequate drying time between multiple coats is a must. Otherwise, the solvent of the new layer can attack the previous layer.

6. Glass micro-balloons: Some paints may be loaded with glass micro-balloons that tend to increase spraying problems, such as proper solvent addition, dry spray and spray gun clogging.